IN THE CLAIMS:

1. (canceled)

2. (canceled)

3. (currently amended) ~~A method in accordance with Claim 2 further comprising~~ A method for determining tissue type, said method comprising:

quantitatively determining a tissue blood flow (TBF) by deconvoluting Q(t) and $C_a(t)$, where Q(t) is a tissue residue function and represents a curve of specific mass of contrast in tissue, and $C_a(t)$ represents an arterial curve of contrast concentration for a tissue having a blood stream containing a contrast without leaking the contrast into an interstitial space of the tissue by solving a matrix equation of Q=Ah for a vector h, and determining a least squares solution for the vector h under an equality constraint, wherein vector h includes a plurality of elements comprising an impulse residue function at different times, Q comprises a vector including elements comprising values of a tissue residue function at different times, A comprises a matrix formed by values of the arterial curve of contrast concentration at different times;

quantitatively determining a tissue blood volume (TBV) by deconvoluting Q(t) and $C_a(t)$, quantitatively determining a TBV comprises quantitatively determining a TBV for the tissue by solving the matrix equation of Q=Ah for the vector h, and determining a least squares solution for the vector h under an equality constraint;

quantitatively determining a tissue mean transit time (TMTT) by deconvoluting Q(t) and $C_a(t)$, quantitatively determining a TMTT comprises quantitatively determining a TMTT for the tissue by solving the matrix equation of Q=Ah for the vector h, and determining a least squares solution for the vector h under an equality constraint; and

determining a tissue type based on the TBF, the TBV, and the TMTT.

4. (original) A method in accordance with Claim 3 wherein determining a least squares solution comprises determining a least squares solution for the vector **h** under a time causality constraint and a minimum transit time constraint.

5. (original) A method in accordance with Claim 4 wherein determining a least squares solution further comprises determining a least squares solution for the vector h under a smoothness constraint, a nonnegativity constraint, and a monotonicity constraint, wherein the smoothness constraint forces h to be smoothly varying, and the monotonicity and nonnegativity constraints force h to start at a maximum and then monotonically decreases towards a zero baseline.

6. (currently amended) ~~A method in accordance with Claim 1 wherein quantitatively determining a TBV comprises quantitatively determining a TBV~~ <u>A method for determining tissue type, said method comprising:</u>

<u>quantitatively determining a tissue blood flow (TBF) by deconvoluting Q(t) and $C_a(t)$, and their combinations thereof, where Q(t) is a tissue residue function and represents a curve of specific mass of contrast in tissue, and $C_a(t)$ represents an arterial curve of contrast concentration</u> for a tissue having a blood stream containing a contrast with leaking the contrast into an interstitial space of the tissue by solving a matrix equation of Q=Ax from the linearization of the tissue residue function for a vector x, wherein vector x includes a plurality of elements comprising TBF, <u>tissue blood volume</u> TBV, <u>tissue mean transit time</u> TMTT, <u>tissue permeability surface area</u> TPS and combinations thereof, Q comprises a vector including elements comprising values of a tissue residue function at different times, A comprises a matrix formed by values of the arterial curve of contrast concentration and tissue residue function at different times and <u>their</u> combinations thereof, quantitatively determining a TBF comprises quantitatively determining a TBF for the tissue by solving the matrix equation of Q=Ax for the vector x,

<ins>quantitatively determining a TBV comprises quantitatively determining a TBV for the tissue by solving the matrix equation of Q=Ax for the vector x,</ins>

quantitatively determining a TMTT comprises quantitatively determining a TMTT for the tissue by solving the matrix equation of Q=Ax for the vector x,

quantitatively determining a TPS comprises quantitatively determining a TPS for the tissue by solving the matrix equation of Q=Ax for the vector x<ins>; and</ins>

<ins>determining a tissue type based on the TBF, TBV, TMTT, and the TPS</ins>.

7. (original) A method in accordance with Claim 6 further comprising determining a least squares solution for the TBF, the TBV, the TMTT, and the TPS under a nonnegativity constraint that determines a TBV, a TBF, a TMTT and a TPS for the tissue where there is leakage of the contrast from the blood stream into the interstitial space.

8. (currently amended) A method in accordance with Claim ~~1~~ <ins>3</ins> further comprising quantitatively determining a partial volume averaging scaling factor for the arterial curve of contrast concentration by:

deconvoluting the measured arterial curve of contrast concentration with a venous curve of contrast concentration to determine a transit time spectrum through a tissue of interest;

extrapolating the arterial curve; and

convolving the extrapolated arterial curve with the transit time spectrum to generate an extrapolated venous curve, wherein the partial volume averaging scaling factor is the ratio of an area underneath the extrapolated arterial curve to an area underneath the extrapolated venous curve.

9. (canceled)

10. (canceled)

11. (currently amended) A method in accordance with Claim ~~1~~ 3 wherein the TBF is a cerebral blood flow (CBF), the TBV is a cerebral blood volume (CBV), and the TMTT is a cerebral mean transit time (CMTT), ~~the TPS is a cerebral TPS,~~ said determining a tissue type based on the TBF, the TBV, and the TMTT~~, and the TPS~~ comprises determining one of a viable tissue and a non-viable tissue based on the CBF, the CBV, and the CMTT~~, and the cerebral TBS~~.

12. (canceled)

13. (currently amended) ~~A system according to Claim 12 further configured to:~~ An imaging system comprising at least one of a computed tomography system and a nuclear magnetic resonance system, said imaging system configured to:

measure Q(t) and $C_a(t)$, where Q(t) is a tissue residue function and represents a curve of specific mass of contrast in tissue, and $C_a(t)$ represents an arterial curve of contrast concentration;

quantitatively determine a ~~TBV~~ tissue blood flow (TBF) for a tissue having a blood stream containing a contrast without leaking the contrast into an interstitial space of the tissue by solving a matrix equation of Q=Ah for a vector h, and determining a least squares solution for the vector h under an equality constraint, wherein vector h includes a plurality of elements comprising an impulse residue function at different times, Q comprises a vector including elements comprising values of a tissue residue function at different times, A comprises a matrix formed by values of the arterial curve of contrast concentration at different times;

quantitatively determine a ~~TBF~~ tissue blood volume (TBV) for the tissue by solving the matrix equation of Q=Ah for the vector h, and determining a least squares solution for the vector h under an equality constraint;

quantitatively determine a TMTT for the tissue by solving the matrix equation of Q=Ah for the vector h, and determining a least squares solution for the vector h under an equality constraint; and

determine a tissue type based on the TBF, the TBV, and the TMTT.

14. (canceled)

15. (currently amended) A system according to Claim ~~14~~ 13 further configured to determine a least squares solution for the vector h under a time causality constraint and a minimum transit time constraint.

16. (currently amended) A system according to Claim ~~15~~ 13 further configured to determine a least squares solution for the vector h under a smoothness constraint, a nonnegativity constraint, and a monotonicity constraint, wherein the smoothness constraint forces h to be smoothly varying, and the monotonicity and nonnegativity constraints force h to start at a maximum and then monotonically decreases towards a zero baseline.

17. (currently amended) ~~A system according to Claim 12 further configured to:~~

An imaging system comprising at least one of a computed tomography system and a nuclear magnetic resonance system, said imaging system configured to:

measure Q(t) and $C_a(t)$, where Q(t) is a tissue residue function and represents a curve of specific mass of contrast in tissue, and $C_a(t)$ represents an arterial curve of contrast concentration;

quantitatively determine a ~~TBV~~ tissue blood flow (TBF) for a tissue having a blood stream containing a contrast with leaking the contrast into an interstitial space of the tissue by solving a matrix equation of Q=Ax from the linearization of the tissue residue function for a vector x, wherein vector x includes a plurality of elements comprising TBF, tissue blood volume

(TBV), tissue mean transit time (TMTT), tissue permeability surface area product (TPS) and combinations thereof, Q comprises a vector including elements comprising values of a tissue residue function at different times, A comprises a matrix formed by values of the arterial curve of contrast concentration and tissue residue function at different times and combinations thereof;

quantitatively determine a ~~TBF~~ TBV for the tissue by solving the matrix equation of Q=Ax for the vector x;

quantitatively determine a TMTT for the tissue by solving the matrix equation of Q=Ax for the vector x; ~~and~~

quantitatively determine a TPS for the tissue by solving the matrix equation of Q=Ax for the vector x; and

determine a tissue type based on the TBF, the TBV, the TMTT, and the TPS.

18. (original) A system according to Claim 17 further configured to determine a least squares solution for the TBF, the TBV, the TMTT, and the TPS under a nonnegativity constraint that determines a TBV, a TBF, a TMTT and a TPS for the tissue where there is leakage of the contrast from the blood stream into the interstitial space.

19. (canceled)

20. (currently amended) A system according to Claim ~~12~~ 17, wherein the TBF is a cerebral blood flow (CBF), the TBV is a cerebral blood volume (CBV), the TMTT is a cerebral mean transit time (CMTT), the TPS is a cerebral TPS, said system further configured to determine one of a viable tissue and a non-viable tissue based on the CBF, the CBV, the CMTT, and the cerebral ~~TBS~~ TPS.

21-31. (canceled)

32. (new) A method in accordance with Claim 6 further comprising quantitatively determining a partial volume averaging scaling factor for the arterial curve of contrast concentration by:

deconvoluting the measured arterial curve of contrast concentration with a venous curve of contrast concentration to determine a transit time spectrum through a tissue of interest;

extrapolating the arterial curve; and

convolving the extrapolated arterial curve with the transit time spectrum to generate an extrapolated venous curve, wherein the partial volume averaging scaling factor is the ratio of an area underneath the extrapolated arterial curve to an area underneath the extrapolated venous curve.